

The Spectrum of Oral Pathology Specimens: a Retrospective Study of 442 Specimens and a Review of Literature

Tariq N Aladily (✉ tnaladily@ju.edu.jo)

The University of Jordan

Huda Eid

The University of Jordan

Deema Dababseh

The University of Jordan

Dalia Waia

The University of Jordan

Farah Baba

The University of Jordan

Research Article

Keywords: oral mass, pathology, odontogenic, oral cancer, salivary gland tumors, prevalence

Posted Date: December 8th, 2021

DOI: <https://doi.org/10.21203/rs.3.rs-1138910/v1>

License:  This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

Abstract

Background: Diseases of the oral cavity are heterogenous in etiology, pathogenesis, histogenesis and clinical outcome. Several epidemiologic studies exist in the literature with variable and conflicting results, based on small sized-samples and geographic factors. The aim of this study is to examine the frequency of oral diseases encountered in our experience from a tertiary hospital and to compare it with previous studies.

Methods: The archives of pathology at Jordan University Hospital were retrospectively searched for specimens of oral cavity and related structures anatomic areas between 2013-2020. Fisher's exact test was performed to examine the statistical difference between the pathologic diagnosis and clinical variables of age, gender and site of specimen. One-way ANOVA test was applied to analyzed the differences in the mean of age among different pathologic groups. *P*-value of less than 0.05 was considered significant.

Results: A total of four-hundred forty-one cases were retrieved. There were 232 (52%) females and 210 (48%) males. The range of age was 3-87 years (mean 43), 46 (10%) of which were children younger than 16 years. Inflammatory and reactive diseases were the most common, constituting 147 (33%) of all specimens, followed by benign neoplasms: 139 (31%), cysts: 114 (26%) then malignant diseases: 42 (10%). Lichen planus was the most common inflammatory disease: 26/147 (18%) and prevailed in patients older than 40 years ($P = 0.0039$). Keratocyst predominated in children and adolescents more than in adults ($P = 0.0015$). Buccal mucosa represented the most frequent site for biopsy: 76 (17%), followed by tongue and maxillary bone: 70 (16%), each.

Conclusion: Inflammatory and benign neoplasms are the most common lesions in oral diseases. Oral malignancy appears to show a low to intermediate frequency compared to previous reports. The study provides a general overview of the spectrum of oral pathology specimens and points to some novel epidemiologic findings that suggests further investigations.

Background

The oral cavity is affected by numerous congenital and acquired diseases. Clinically, various lesions may mimic each other and have very similar appearances. This is precisely why histopathology is essential in clinical practice. However, the clinical and radiologic inputs remain important to correlate with in order to reach the correct diagnosis [1].

Surgical biopsies from oral cavity constitute a minority of examined cases in histopathology practice in general [1]. Yet, these lesions are heterogenous and can arise from different and unrelated anatomic structures. Unlike other areas in the body, oral pathology is overlapped by different disciplines of human medicine such as general surgery, plastic surgery, ENT, dentistry and maxillofacial surgery. Thus, diseases of the oral cavity differ significantly in their histogenesis, biologic behavior and management [2].

There are several studies in the literature that examined the frequency of diseases of oral pathology. The results were variable and inconsistent, mainly due to differences in sample sizes and the nature of the medical institution. The aim of this study is to provide a general epidemiologic overview of oral specimens which were referred from all specialties of medicine over a relatively long period of time. We hope this study provides a better insight and a more comprehensive knowledge about the frequency of oral diseases to the medical and dental communities.

Methods

This is a retrospective study that was conducted in the department of Pathology at The University of Jordan. A computer-based search of pathology reports was used to sort out specimens related to oral cavity between January, 2014 – June, 2021. Relevant clinical variables such as age, gender, anatomic site of specimens were included. Cases with inconclusive diagnosis or insufficient biopsy were excluded. The study was approved by the local Institutional Review Board and the Scientific Research Committee (3798/2020/67).

All biopsy specimens were fixed in formalin and embedded in paraffin. Hematoxylin and Eosin stain was routinely used in preparing slides. Based on the pathogenesis, the diseases were classified into four main categories: inflammatory (reactive), degenerative (cysts), benign and malignant tumors. Neoplastic diseases were classified according to the WHO-classification system for oral pathology [3]. Statistical analysis was performed using Fisher's exact test to examine the difference between pathologic diseases and their relationship with age and gender. One-way ANOVA and Post Hoc Tukey test was applied to compare the variances in mean age among different categories of oral diseases. We adopted a *P*-value of 0.05 as a cutoff for statistical significance. We then reviewed the literature for similar studies through Pubmed and Google Scholar search engines using key words of "oral pathology, oral specimens, epidemiology, frequency".

Results

Characteristics of patients

A total of four-hundred forty-one cases were retrieved. The patients were 232 (52%) females and 210 (48%) males, with a range of age of 3-87 years (mean 43). The age distribution of patients was as the following: children and adolescents (3-16 years old): 46 (10%), 17-29 years: 68 (15%), 30-39 years: 69 (16%), 40-49 years: 83 (19%), 50-59 years: 82 (19%), 60-69 years: 58 (13%), 70 years and older: 35 (8%).

Spectrum and characteristics of diseases

Inflammatory diseases were the most common finding, constituting 147 (33%) of all specimens. They slightly outnumbered benign neoplasms: 139 (31%), then cysts: 114 (26%) and cancer: 42 (10%). Lichen planus, including lichenoid reaction, was the most commonly encountered inflammatory disease: 26

(18%). Odontogenic cysts accounted for the majority of cystic diseases: 101 (89%), while the remaining cases were salivary or dermoid in origin. The predominant benign tumors were squamous papilloma: 46 (33%) and capillary hemangioma: 45 (32%), followed by odontogenic: 15 (11%), salivary: 15 (11%), fibrous: 12 (9%) and other mesenchymal tumors: 5 (4%). Among malignant neoplasms, squamous cell carcinoma (SCC) was the most common: 30 (71%), followed by salivary gland cancer: 8 (19%) then lymphoma: 4 (10%). The most common salivary gland cancer was acinic cell carcinoma, followed by mucoepidermoid carcinoma. Only 3/19 (16%) of leukoplakia showed dysplasia. The details of diseases of each category are explained in Table-1.

Table-1: A general overview of most common oral diseases and their clinicopathologic features

Disease	Number (percentage)	Range of age (mean: y)	Male (n)	Female (n)	Most common site: (n)
Inflammatory/reactive conditions (n=147)					
Lichen planus	26 (18%)	31-69 (51)	10 (38%)	16 (62%)	Buccal mucosa: 19 (73%)
Non-specific inflammation	24 (16%)	15-71 (46)	8 (33%)	16 (67%)	Tongue: 10 (42%)
Leukoplakia	19 (13%)	24-76 (52)	10 (53%)	9 (47%)	Tongue: 7 (37%)
Giant cell granuloma	16 (11%)	9-60 (34)	6 (38%)	10 (62%)	Gingiva: 15 (94%)
Irritation fibroma (epulis)	15 (10%)	33-66 (47)	3 (20%)	12 (80%)	Gingiva: 9 (60%)
Bullous diseases	13 (9%)	15-73 (45)	4 (31%)	9 (69%)	Buccal mucosa: 11 (85%)
Infections	13 (9%)	8-81 (44)	8 (62%)	5 (38%)	Gingiva: 4 (31%)
Benign tumors (n=139)					
Squamous papilloma	46 (33%)	6-87 (47)	15 (33%)	31 (61%)	Buccal mucosa: 23 (50%)
Hemangioma	45 (32%)	3-75 (36)	20 (44%)	25 (66%)	Lips: 18 (40%)
Pleomorphic adenoma	15 (11%)	30-65 (47)	7 (47%)	8 (53%)	Buccal mucosa: 8 (53%)
Ameloblastoma	11 (8%)	11-74 (44)	7 (64%)	4 (36%)	Mandible: 6 (55%)
Ossifying fibroma	6 (4%)	12-51 (32)	2 (33%)	4 (67%)	Mandible: 3 (50%)
Granular cell tumor	3 (2%)	47-55 (52)	3 (100%)	0	Tongue: 3 (100%)
Complex odontoma	3 (2%)	10-41 (23)	1 (33%)	2 (67%)	Maxilla: 2 (67%)
Cysts (n=114)					
Radicular cyst	55 (48%)	9-72 (38)	38 (69%)	17 (31%)	Maxilla: 34 (62%)
Dentigerous cyst	33 (29%)	8-64 (32)	18 (55%)	14 (45%)	Maxilla: 17 (52%)

Disease	Number (percentage)	Range of age (mean: y)	Male (n)	Female (n)	Most common site: (n)
Keratocyst	14 (12%)	10-68 (27)	9 (64%)	5 (35%)	Mandible: 9 (64%)
Mucocele	11 (10%)	8-50 (29)	5 (45%)	6 (55%)	Lip: 7 (64%)
Dermoid cyst	1 (0.8%)	49	1 (100%)	0	Palate: 1 (100%)
Malignant tumors (n=42)					
Squamous cell carcinoma	24 (57%)	25-78 (57)	17 (71%)	7 (29%)	Tongue: 16 (67%)
Basal cell carcinoma	6 (14%)	52-77 (66)	2 (33%)	4 (67%)	Lip: 6 (100%)
Acinic cell carcinoma	5 (12%)	35-87 (57)	1 (20%)	4 (80%)	Palate: 3 (60%)
Lymphoma	4 (10%)	12-62 (43)	1 (25%)	3 (75%)	Tonsil: 4 (100%)
Mucoepidermoid carcinoma	3 (7%)	24-57 (45)	3 (100%)	0	Palate: 1, mandible: 1 tongue: 1

Cystic diseases were the most common finding during the first three decades and declined afterward. Benign neoplasms predominated during the fourth decade and inflammatory lesions in the fifth. Malignant diseases reached its peak in the sixth decade and afterward. The mean age for each group was as the following: inflammatory diseases: 47 years (range 8-81), cystic diseases: 33 years (range 8-72), benign tumors: years 41 (range 3-87), malignant tumors: 56 years (range 12-87). Figure-1 demonstrates the relationship between the categories of diseases and patients' age.

Buccal mucosa represented the most frequent site for biopsy: 76 (17%), followed by tongue and maxillary bone: 70 (16%), each, gingiva and inner lip: 65 (15%) each, mandible: 62 (14%), palate: 22 (5%), floor of mouth: 7 (2%) then tonsils: 5 (1%). Figure-2 shows the relative anatomic distribution of diseases.

Statistical Analysis

Keratocyst was more common in children and adolescents: 6/46 (13%) than in adults: 8/396 (2%), which is statistically significant ($P = 0.0015$). Lichen planus was more common in patients older than 40 years: 22/234 (9%) than younger: 4/182 (2%) which is also statistically significant ($P = 0.0039$). Oral cysts occurred at a significantly younger age (One-way ANOVA and Post Hoc Tukey test $P = 0.000$). Regarding gender, the only statistically significant difference was seen in irritation fibroma, which was more common in females ($P = 0.035$).

Discussion

Mucosa of the oral cavity and lips shares a lot of histologic features with the skin. Inflammatory and neoplastic conditions are almost identical in both tissues. However, the oral cavity is subject to a different microenvironment and attains more functions that predisposes it to distinct patterns of diseases [4]. In addition, odontogenic and salivary gland lesions arise in the oral cavity but not skin. They are diverse and represent a significant fraction of pathology specimens there.

The recent advancement in medical sciences changed the trends of clinical practices in the last decades. Oral lesions were often treated empirically and surgical biopsies were done by general dentists. Currently, oral biopsies are routinely taken for diagnostic pathology which is reflected by the increasing number of referred specimens annually [5]. In certain situations, the procedure is performed by more specialized practitioners such as oral pathologists, maxillofacial, head and neck, ENT and plastic surgeons. All of these factors enhanced reaching accurate diagnoses and provided a better patient care. Thus, the practice of oral pathology requires well-knowledgeable and experienced pathologists.

In this study, inflammatory diseases were the most common group, slightly outnumbering benign neoplasms. A similar finding was reported in many previous studies [2, 6–9], while in some, benign neoplasms were more common [10, 11]. Interestingly, oral lichen planus was the most common inflammatory condition in this study (18%) exceeding what was reported in Turkey (11.9%) and Kuwait (4.6%) [6, 12]. Lichen planus is an inflammatory mucocutaneous disease of unknown etiology and its epidemiology varies between 1-3% among populations [13]. The disease is associated with diabetes [14]. A similar condition, called lichenoid reaction, occurs secondary to an obvious factor, such as drug exposure. The high frequency of lichen planus in our study could be attributed to the high prevalence of diabetes which affects 16% of Jordanian population [15]. In addition, we combined both lichen planus and lichenoid reaction in the same category due to incomplete medical history in many cases. Yet, the accurate explanation mandates a focused study in the future.

Odontogenic cysts are heterogenous diseases that arise from odontogenic epithelium [3]. Similar to our study, radicular cyst was the most common odontogenic cyst, followed by dentigerous then Keratocyst [16–20]. Radicular cyst typically complicates inflammatory conditions such as trauma or dental caries, while dentigerous cyst is a developmental anomaly and is associated with unerupted tooth. In contrast, keratocyst is a neoplastic disorder but it is still classified under the umbrella of odontogenic cysts in the World Health Organization classification system [3]. Both radicular and keratocysts can affect any age-group, but the peak incidence is in the fourth-fifth decade and the third decade, respectively [3, 21–22]. A peculiar finding in our study is that the overall incidence of odontogenic cysts peaked at younger age-groups, and the frequency of radicular cyst was more common in children than in adult. Similarly, the mean age of keratocyst was 27 years, which was -again- younger than what was described previously [22].

Squamous papilloma and pyogenic granuloma equally predominated benign tumors in our study and appeared in a wide range of age. Squamous papilloma carried different names in previous studies such

as fibroepithelial polyp or fibroepithelial hyperplasia was consistently very common, while pyogenic granuloma exhibited a variable frequency from high and low [2, 6, 9, 12]. It is noteworthy to mention that Human Papilloma Virus-related proliferation, which may mimic squamous papilloma, were not encountered. Salivary gland tumors and odontogenic tumors were less common, and the vast majority of cases were of pleomorphic adenoma and ameloblastoma, respectively. Benign soft tissue tumors very rarely occurred.

A few previous studies showed that cancer was the most common finding in oral specimens [1, 4, 18, 23–24]. Malignant tumors constituted 10% of specimens in our series, which is close to what was reported in Libya (8%), UAE (14.9%) and Iraq (14.5%) but higher than Kuwait (3.6%), Spain (3.9%) and UK (5.4%) [6, 23–26]. In contrast, a few studies showed that malignancy was the dominant disease among oral biopsies [27, 28]. SCC represented, by far, the most common oral cancer in our and all previous reports. It is known to be strongly associated with certain environmental factors and personal habits such as smoking, tobacco chewing and poor oral hygiene. This explains the high prevalence of SCC and thus high frequency of malignant lesions in oral biopsy in some geographic areas such as India and Southwest Saudi Arabia. According to this study, the Jordanian population falls within the low-frequency of oral cancers, most of which is SCC, while primary salivary gland carcinoma and lymphoma are uncommon.

Intraoral, minor salivary glands tumors, are relatively uncommon accounting for 25% of all salivary gland tumors. In contrast to large salivary glands, tumors of minor salivary glands show a higher rate of malignancy reaching approximately half of cases [29]. In previous reports, pleomorphic adenoma was consistently the most common benign tumor, while the most common malignancy was either mucoepidermoid and adenoid cystic carcinomas. Our study shows a relatively lower percentage of malignancy in minor salivary glands, and the most common type was acinic cell carcinoma.

Conclusion

In short, this study provides a comprehensive overview about the prevalence of oral pathology lesions from a tertiary medical center. The most common oral diseases were inflammatory in nature, while malignant neoplasms were the least common and aligned with the prevalence described in surrounding countries. On the other hand, the study showed a handful of novel findings. Odontogenic cysts tended to occur at younger age groups. Malignant tumors of minor salivary glands were rare and were led by acinic cell carcinoma. A larger, multi-institutional study in the future is recommended to assert these novel findings.

Declarations

Acknowledgements

Not applicable

Authors' contributions

TA: idea, writing and reviewing manuscript, supervision; HE: writing draft, literature review; DD: writing draft- figures and artwork; DW: data collection and analysis; FB; data collection and analysis. All authors read and approved the final manuscript.

Funding

Not applicable

Availability of data and materials

Material form: all archived data of patients' pathologic reports from 2014-2021 of oral biopsies were collected. *Location:* Jordan University Hospital- The University of Jordan; *The material can be accessed:* The datasets supporting the conclusions of this article are available from the corresponding authors upon reasonable request.

Ethics approved and consent to participate

The study was approved by the Scientific Research Committee in School of Medicine at The University of Jordan and by the Institutional Review Board at Jordan University hospital (No. 3798/2020/67). The methods followed the regulations and guidelines of the local regulatory committees. Informed consent was waived by the Institutional Review Board. Consent to participate: not applicable as the study is a retrospective and limited to pathology reports.

Consent for publication

Not applicable

Competing interest

The authors declare they have no conflict of interests

Financial Disclosure

The study was sponsored by the Faculty of Scientific Research at The University of Jordan

Conflict of interest

none

References

1. Dholakiya Z, Gohel A, Suri SK, Patel SM. Histopathological interpretation of oral cavity lesions: study at a tertiary care hospital. IOSR J Dent Med Sci. 2019;18(4):40-7.
2. Butt S, Ali R, Gul S, Effan F, Rara SN, Amin MS, Malik JZ. Spectrum of Oral Cavity Lesions Received in Histopathology Department from Dental Section of Lahore Medical and Dental College. PJMHS.

- 2020;14(4):867-9.
3. El-Naggar AK, Chan JKC, Grandis JR, Takata T, Slootweg PJ. WHO Classification of Head and Neck Tumours. Fourth Edition. Lyon: IARC;2017.
 4. Patro P, Lad P, Mithila KB, Sahu S. A Histopathological study of oral cavity lesions. *Int J Health Sci Res.* 2020;10(3):17-21.
 5. Franklin CD, Jones AV. A survey of oral and maxillofacial pathology specimens submitted by general dental practitioners over a 30-year period. *British dental journal.* 2006 Apr;200(8):447-50.
 6. Joseph BK, Ali MA, Dashti H, Sundaram DB. Analysis of oral and maxillofacial pathology lesions over an 18-year period diagnosed at Kuwait University. *Journal of investigative and clinical dentistry.* 2019 Nov;10(4):e12432.
 7. Alhindi NA, Sindi AM, Binmadi NO, Elias WY. A retrospective study of oral and maxillofacial pathology lesions diagnosed at the Faculty of Dentistry, King Abdulaziz University. *Clinical, cosmetic and investigational dentistry.* 2019;11:45..
 8. Bajracharya D, Gupta S, Ojha B, Baral R. Prevalence of Oral Mucosal Lesions in a Tertiary Care Dental Hospital of Kathmandu. *J Nepal Med Assoc.* 2017 Jul 1;56(207):362-6.
 9. Tariq S, Khan YN, Shaheen U, Qaisrani AR, Rasheed A, Bukhari MH. Spectrum of Oral Lesions in a Tertiary Care Teaching Hospital. *Journal of Sheikh Zayed Medical College (JSZMC).* 2019;10(4):35-40.
 10. Baral R, Sharma BP, Sherpa P. Histopathology of orodental biopsies. *Journal of Pathology of Nepal.* 2015 Sep 14;5(10):810-3.
 11. Acharya S, Pradhan A, Shivraj KC, Mahato M, Acharya SC. Spectrum of oral lesions in a tertiary care center of Nepal. *Journal of Chitwan Medical College.* 2021 Mar 26;11(1):61-3.
 12. Sengüven B, Bariş E, Yildirim B, Shuibat A, Yücel ÖÖ, Museyibov F, Yildiz Y, Büyük Ö, Gültekin SE. Oral mucosal lesions: a retrospective review of one institution's 13-year experience. *Turkish journal of medical sciences.* 2015 Jan 27;45(1):241-5.
 13. McCartan BE, Healy C. The reported prevalence of oral lichen planus: a review and critique. *Journal of oral pathology & medicine.* 2008 Sep;37(8):447-53.
 14. Hasan S, Ahmed S, Kiran R, Panigrahi R, Thachil JM, Saeed S. Oral lichen planus and associated comorbidities: An approach to holistic health. *Journal of family medicine and primary care.* 2019 Nov;8(11):3504.
 15. Awad SF, Huangfu P, Dargham SR, Ajlouni K, Batieha A, Khader YS, Critchley JA, Abu-Raddad LJ. Characterizing the type 2 diabetes mellitus epidemic in Jordan up to 2050. *Scientific reports.* 2020 Dec 3;10(1):1-0.
 16. Kelloway E, Ha WN, Dost F, Farah CS. A retrospective analysis of oral and maxillofacial pathology in an Australian adult population. *Australian dental journal.* 2014 Jun;59(2):215-20.
 17. Tay AB. A 5-year survey of oral biopsies in an oral surgical unit in Singapore: 1993-1997. *Annals of the Academy of Medicine, Singapore.* 1999 Sep 1;28(5):665-71.

18. Saleh SM, Idris AM, Vani NV, Tubaigy FM, Alharbi FA, Sharwani AA, Mikhail NT, Warnakulasuriya S. Retrospective analysis of biopsied oral and maxillofacial lesions in South-Western Saudi Arabia. *Saudi medical journal*. 2017 Apr;38(4):405.
19. Sixto-Requeijo R, Diniz-Freitas M, Torreira-Lorenzo JC, García-García A, Gándara-Rey JM. An analysis of oral biopsies extracted from 1995 to 2009, in an oral medicine and surgery unit in Galicia (Spain). *Medicina oral, patologia oral y cirugía bucal*. 2012 Jan;17(1):e16.
20. Lei F, Chen PH, Chen JY, Wang WC, Lin LM, Huang HC, Ho KY, Chen CH, Chen YK. Retrospective study of biopsied head and neck lesions in a cohort of referral Taiwanese patients. *Head & face medicine*. 2014 Dec;10(1):1-3.
21. Titinchi F, Morkel J. Residual cyst of the jaws: A clinico-pathologic study of this seemingly inconspicuous lesion. *Plos one*. 2020 Dec 17;15(12):e0244250.
22. MacDonald-Jankowski DS. Keratocystic odontogenic tumour: systematic review. *Dentomaxillofacial Radiology*. 2011 Jan;40(1):1-23.
23. Subhashraj K, Orafi M, Nair KV, El-Gehani R, Elarbi M. Primary malignant tumors of orofacial region at Benghazi, Libya: a 17 years review. *Cancer epidemiology*. 2009 Nov 1;33(5):332-6.
24. Anis R, Gaballah K. Oral cancer in the UAE: a multicenter, retrospective study. *Libyan Journal of Medicine*. 2013;8(1).
25. Fuoad SA, Mohammad DN, Hamied MA, Garib BT. Oro-facial malignancy in north of Iraq: a retrospective study of biopsied cases. *BMC Oral Health*. 2021 Dec;21(1):1-0.
26. Jones AV, Franklin CD. An analysis of oral and maxillofacial pathology found in adults over a 30-year period. *Journal of oral pathology & medicine*. 2006 Aug;35(7):392-401.
27. Priyanka S, Karuna G, Sunita S, Ajay Y. A study of Clinico-pathological Spectrum of Oral Cavity Lesions at a Tertiary Care Hospital. *JMSCR*. 2018;6(4):267-76.
28. Suvernkar SV, Sadhu D, Rane M, Siddiqui NA. Clinicopathological Study of Oral Cavity Lesions in a Tertiary Care Hospital.
29. Wang D, Li Y, He H, Liu L, Wu L, He Z. Intraoral minor salivary gland tumors in a Chinese population: a retrospective study on 737 cases. *Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology, and Endodontology*. 2007 Jul 1;104(1):94-100.

Figures

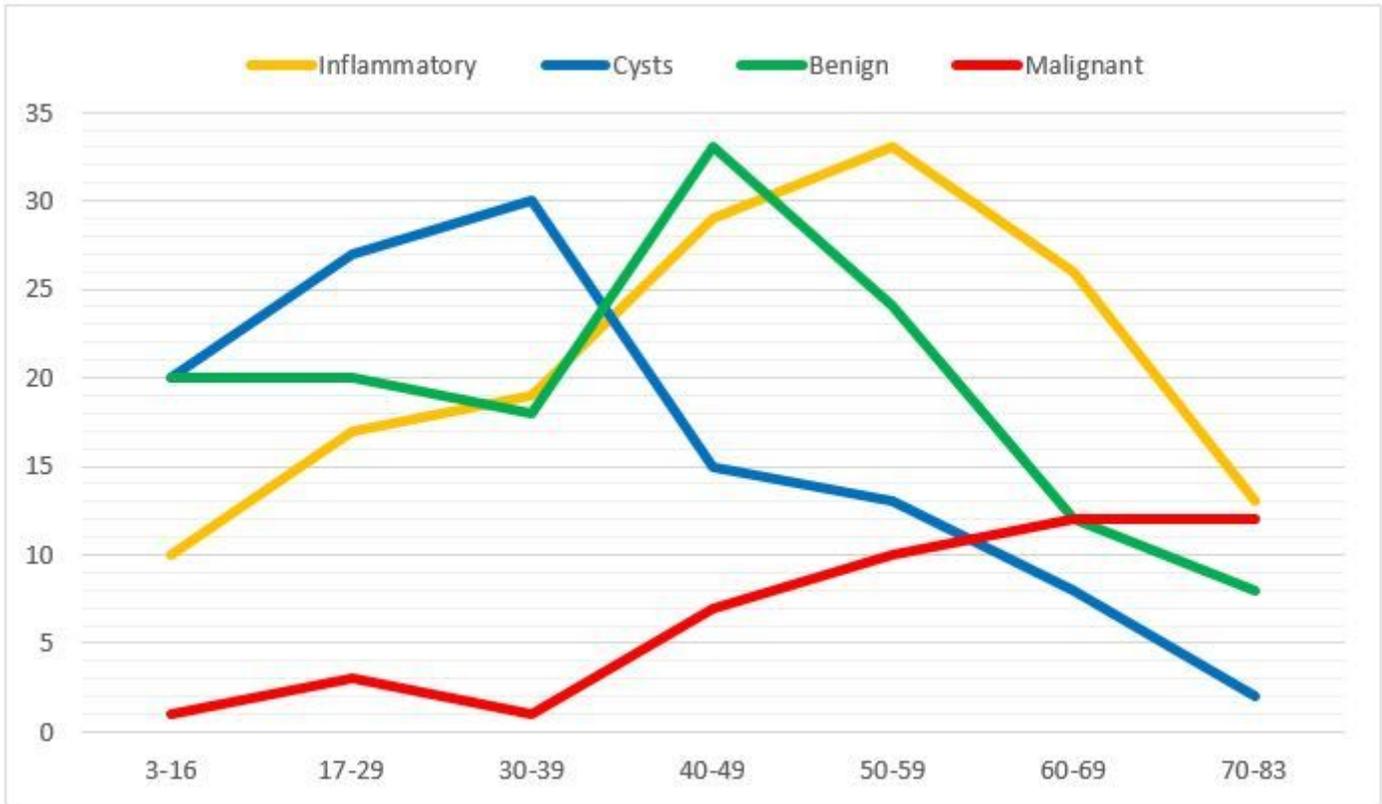


Figure 1

Relative distribution of the four disease categories according to age of patients. X-axis: age groups, Y-axis: number of cases.

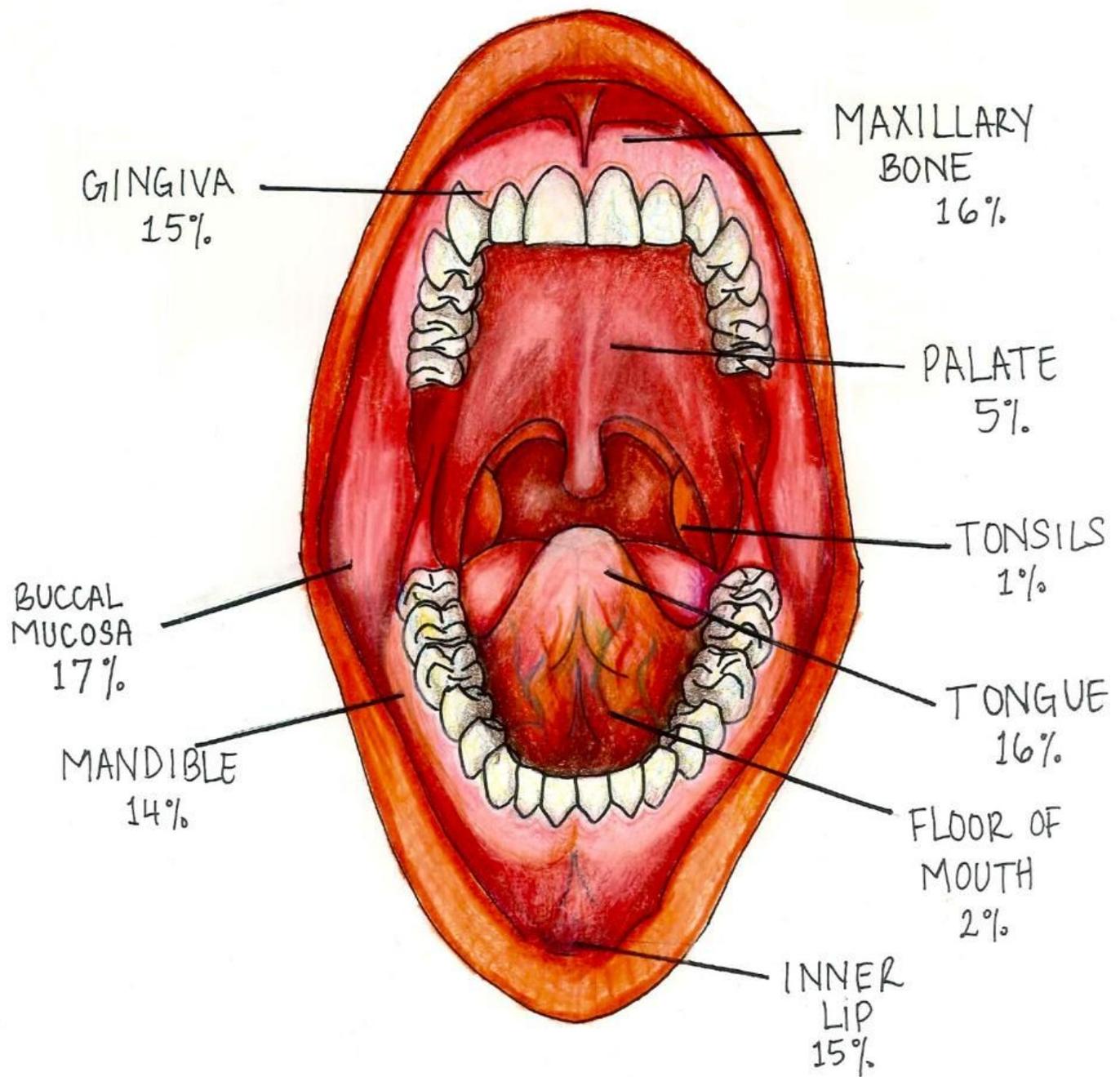


Figure 2

Frequency of oral biopsies according to anatomic sites.